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The effects of structure, communication and trust between Marketing and R&D during new product development

Elias Kyriazis
University of Wollongong, kelias@uow.edu.au

Graham Massey
University of Technology, Sydney

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Keywords
Effects, Structure, Communication, Trust, between, Marketing, during, Product, Development

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The Effects of Structure, Communication, and Trust Between Marketing and R&D during New Product Development

Elias Kyriazis
School of Management and Marketing, University of Wollongong
Wollongong, 2522, Australia
Tel: +61-0242-214-871, Fax: +61-0242-214-154, Email: elias_kyriazis@uow.edu.au

Graham Massey
School of Marketing, University of Technology
Sydney, Broadway NSW 2007, Australia
Tel: +61-9514-3480, Fax: +61-9514-3535, Email: graham.massey@uts.edu.au

Abstract
The ability to effectively manage cross-functional working relationships (CFRs) during innovation is a key success factor in developing successful new products. However, empirical evidence suggests that CFRs during new product development are often problematic, resulting in extremely poor relations between managers, and the development of unsuccessful new products. This paper adds to our existing knowledge on the Marketing/R&D CFR by examining the effects of structural factors, communication behaviours, and interpersonal trust on the dependent variable perceived relationship effectiveness. Our findings reveal that trust has potent positive, direct effects on this CFR. Further, bidirectional communication and quality of communication also have strong effects on relationship effectiveness, as well as strong indirect effects via the building of interpersonal trust. In addition, we find that the structural variables formalisation and centralisation also influence communication behaviours on NPD projects.

Keywords: Cross-functional relationships; trust, new product development; Marketing/R&D relationships

1. Introduction
Over the past two decades, Marketing’s cross-functional relationships (CFRs) have become an important focus of academic research (e.g., Fisher, Maltz, & Jaworski, 1997; Song, Xie, & Dyer, 2000). In this study we examine the Marketing/R&D CFR, which is of significant managerial and theoretical importance, because this CFR is especially critical during the new product development (NPD) projects (Wind, 1982; Souder, 1987). The better these two functions are integrated, the greater the likelihood of successful NPD outcomes (Griffin & Hauser, 1996; Souder, 1981). Empirical evidence suggests however, that Marketing/R&D CFRs are often problematic, leading to the development and launch of unsuccessful products (e.g., Souder, 1981). A major challenge for management is therefore to facilitate integration between Marketing and R&D during NPD projects.

A wide range of factors are known to affect cross-functional integration, including structural mechanisms, the communication behaviours of functional managers, and trust between those managers. In this research we therefore examine the effects of these factors on CFRs during NPD, by specifying and testing an integrative structural model of relationship effectiveness.

Our paper is structured as follows. First we outline the theoretical foundations of this research. We then present our conceptual framework, define the key constructs, and justify
their inclusion in our model. Next we present our structural model and develop our hypotheses. We then describe our research methods, and report the results of our empirical tests. We conclude by discussing the implications of our research, its limitations, and possible topics for future research.

2. Theoretical Foundations

We draw on two theoretical foundations to develop our model, Weber’s (1924/47) theory of bureaucracy, and the interaction approach (e.g., Morgan & Hunt, 1994). From Weber (1947) we draw our two structural dimensions—formalisation, and centralisation because the literature suggests they are important aspects of coordination (e.g., Ayers, Dahlstrom, & Skinner, 1997; Rajagopalan, Rasheed & Datta, 1993). We also draw on the interaction approach, which is used in many studies of marketing’s CFRs, and focuses on understanding how factors such as communication and trust predict satisfaction, performance, and relationship continuity (e.g., Moenaert, Souder, DeMeyer, and Deschoolmeester, 1994; Ruekert & Walker, 1987). In this research we make a number of contributions. First, interpersonal trust has not previously been the main focus of prior research into the Marketing/R&D CFR. Previous research examines trust as an outcome of interdepartmental interactions (e.g., Souder 1981,1988; Jassawalla and Sashittal, 1998) but not as a key explanatory variable. Second, ours is the first study to examine two underlying dimensions of trust on NPD projects, i.e., cognition- and affect-based trust (McAllister, 1995). Third, whilst structural constructs are usually examined at the departmental level, we examine them at the project level, and are therefore better able to assess their effects on the NPD project. Fourth, we reveal the importance to the Marketing/R&D CFR of high quality, collaborative communication during NPD.

3. Conceptual Framework

3.1 Dependent Variable: Perceived relationship effectiveness

Our dependent variable perceived relationship effectiveness, based on Van de Ven’s (1976) construct, relates to whether the R&D Manager perceives their relationship with the Marketing Manager to be worthwhile, equitable, productive and satisfying during the NPD project.

**Figure 1: Hypothesised Model of the Marketing/R&D CFR**
3.2 Explanatory Variables

3.2.1 Structural/Bureaucratic Dimensions

A key managerial challenge during NPD is to coordinate the activities of functionally specialised, interdependent actors. Weber’s (1947) structural dimensions—formalisation and centralisation are one means by which this is achieved, and a number of studies have identified them as important determinants of effective CFRs during NPD (e.g., Olson, Walker, & Ruekert, 1995; Song, Neely, & Zhao, 1996). Formalisation is defined as the emphasis placed on following rules and procedures when doing one’s job (cf. Pugh et al., 1968). Centralisation is defined as the extent to which decisions are made at higher levels in a firm’s hierarchy (Aiken & Hage, 1968). These structural variables are used in this study even though the “marketing” activities of organisations are becoming diffused within organisations (Krohmer, Homburg and Workman (2002) however, marketing is still a separate function in many organizations.

3.2.2 Communication variables

Effective cross-functional communication assists integration by reducing uncertainty over customer preferences, competitors, and the environment (Souder & Moenaert, 1992), and can help deliver successful NPD outcomes (cf. Griffin & Hauser, 1996). Consistent with this many formal NPD models (e.g., Stage Gate; Concurrent Engineering; QFD) heavily emphasise cross-functional communication.

Here we examine three communication variables—frequency, bidirectionality, and quality. We examine communication frequency because it is a key variable affecting many types of relationships (e.g., Mohr & Nevin, 1990; Ruekert & Walker, 1987). Communication frequency is defined as the intensity of information flows between the Marketing Manager and the R&D Manager via means such as formal meetings, reports, and telephone conversations (Van de Ven & Ferry, 1980).

We include bidirectional communication because recent research has established its importance in CFRs and other exchange relationships (e.g., Fisher et al. 1997; Mohr, Fisher, & Nevin, 1996). Importantly, others have noted that bidirectional communication is especially important during NPD (e.g., Wheelwright & Clark, 1992). We define this construct as the extent to which communication between our two focal managers is a two-way process (Fisher et al. 1997).

Lastly, we include communication quality because a number of studies have found that the quality of communication provided by Marketing to R&D on NPD projects affects the CFR (e.g., Gupta, Raj & Wilemon, 1986; Gupta & Wilemon, 1988). We define communication quality in terms of how credible, understandable, relevant, and useful information provided by the Marketing Manager was for the R&D Manager’s task completion (Moenaert & Souder, 1992).

3.2.3 Interpersonal trust

Trust between interdependent actors helps coordinate actions, and improve effectiveness (Pennings & Woiceshyn, 1987; Seabright, Leventhal, & Fichman, 1992), and can therefore assist firms using cross-functional teams, or other cooperative structures to coordinate work. Trust is important in CFRs because managers need to act as boundary spanners and develop effective horizontal ties within the firm (Gabarro, 1990; McAllister, 1995) and the existence, nature (e.g., positive or negative) and the extent (e.g., trust to distrust) is an important aspect of such working relationships.

Interpersonal trust has been conceptualised in various ways, e.g., as credibility, in which the trusted person fulfils oral or written statements or promises (e.g., Moorman, Zaltman, & Deshpandé, 1992). Another perspective is that trust involves a general concern for other
people, and transcends the personal profit motive, i.e., benevolence (e.g., Rempel, Holmes, Zanna, 1985). The perspective which we adopt in this paper is similar, i.e., that trust has two underlying dimensions, one cognitive, and the other affective (McAllister, 1995). Cognition-based trust can arise from previous occasions in which another person has been competent, reliable, and dependable. In contrast, affect-based trust is an emotional form of trust, in which one party exhibits genuine concern and care for the welfare of the other person.

4. Hypotheses Development

4.1 Effects of Interpersonal Trust

4.1.1. Cognition-based trust

Cognition-based trust relates to beliefs about peer reliability, competence, and dependability (McAllister, 1995), therefore low cognition-based trust should be associated with lower relationship effectiveness. Where a Marketing Manager is perceived to be competent, dependable and reliable, the R&D Manager will be more likely to perceive their CFR with that manager to be effective.

Further, both theory and empirical evidence (e.g., Lewis & Weigert, 1987; McAllister, 1995) suggest that affect-based trust develops from an existing cognitive base. We therefore argue that affective trust is more likely to emerge once cognitive trust has emerged. We therefore hypothesise:

\[ H_{1a,b}: \text{As cognition-based trust increases, (a) perceived relationship effectiveness will increase, (b) affect-based trust will increase.} \]

4.1.2. Affect-based trust

Affect-based trust is grounded in reciprocated interpersonal care and concern for another person (Pennings & Woiceshyn, 1987; Rempel et al., 1985), and involves subjective feelings of security against exploitation in a relationship (Mittal, 1996). Consistent with this, McAllister (1995) found that managers reporting high affect-based trust seek more opportunities to meet peers' work-related needs, and engage in more productive interventions. In CFRs where there is affect-based trust, R&D Managers are therefore more likely to report that their CFR with a Marketing Manager is effective. Accordingly we hypothesise:

\[ H_{1c}: \text{As affect-based trust increases, perceived relationship effectiveness will increase.} \]

4.2 Effects of Managerial Communication Behaviours

4.2.1. Communication Frequency

Bidirectional communication

If peer manager communication is frequent, it is likely that this communication will be reciprocated, given that norms of reciprocity are deeply ingrained in most cultures (Gouldner, 1960). Frequent communication during NPD is therefore likely to lead to more bidirectional communication (Wheelwright & Clark, 1992). Further, because frequent communication can increase one's understanding of a peer's operational domain and information requirements, (Souder, 1987), this may also lead to an increase in bidirectional communication in order to satisfy that manager's information needs. Accordingly, we hypothesise:
**H2a:** Greater communication frequency will lead to greater bidirectional communication.

**Cognition-based trust**

Recent research has found a strong positive correlation between frequent communication and perceived trustworthiness of peer managers (Becerra & Gupta, 2003). Frequent communication allows managers to make assessments of the competence and reliability of others within the firm (McEvily, Perrone, & Zaheer, 2003). We therefore hypothesise:

**H2b:** Greater communication frequency will lead to greater cognition-based trust.

**Perceived relationship effectiveness**

Communication frequency is likely to be important in the Marketing/R&D CFR, because Fisher et al. (1997) found that communication frequency between Marketing Managers and Engineering Managers increased perceived relationship effectiveness. Similarly, Song, Neeley and Zhao (1996) found that R&D identified a lack of communication as a major barrier to effective CFRs with Marketing. Hence infrequent communication between functional managers may indicate that the CFR is ineffective. We therefore hypothesise:

**H2c:** Greater communication frequency will lead to greater perceived relationship effectiveness.

### 4.2.2. Effects of Bidirectional Communication

**Quality of Communication**

Bidirectional communication has been found to be important during NPD projects. Fisher et al. (1997) for example, found that bidirectional communication between Marketing and Engineering Managers has a strong positive correlation with information use. Where managers have a high propensity to use information provided, it is likely that they perceive that information to be high in quality. We therefore expect bidirectional communication to be associated with the provision of quality information to peer managers. Accordingly we hypothesise:

**H3a:** Greater bidirectional communication will lead to greater quality of communication.

**Cognition-based trust**

Bidirectionality is a collaborative, reciprocal form of communication, and where managers communicate in this way, it provides opportunities for those managers to demonstrate the work-related reliability which is the basis of cognition-based trust. Also, given that decision-making on complex tasks such as NPD requires effective information exchange, it seems reasonable to expect that where bidirectionality is high, managers are more likely to have work-related confidence in each other (i.e., CBT). Thus, we predict:

**H3b:** Greater bidirectional communication will lead to greater CBT.

**Affect-based trust**

Bidirectional communication is often informal and personal (Huber & Daft, 1987), and because interpersonal cues are generally harder to misconstrue in face-to-face interactions (Good, 1988), this type of interaction can allow the social aspects of relationships to emerge. We therefore argue that where bidirectional communication exists, peer managers are more
likely to have favourable beliefs about the other person, and have the other's interests at heart. Thus, we predict:

\[ H_{3c}: \text{Greater bidirectional communication will lead to greater ABT.} \]

**Perceived Relationship Effectiveness.**

Feedback is important during communication because it provides opportunities to increase the clarity of communication and reduce misunderstandings (Fisher, 1978). Accordingly, high bidirectionality should be associated with higher relationship effectiveness. Empirical support for this is provided by Fisher et al. (1997) who found that bidirectional communication had a significant positive effect on the perceived effectiveness of the Marketing/Engineering CFR. Thus, we predict:

\[ H_{3d}: \text{Greater bidirectional communication will lead to higher perceived relationship effectiveness.} \]

4.2.3. **Quality of Communication**

When marketing information received by R&D is perceived to be high quality, the Marketing Manager is perceived to be more trustworthy, competent, and knowledgeable (Gupta & Wilemon, 1988). As cognition-based trust concerns work-related competence and professionalism, both of which can be demonstrated via quality communication, the provision of quality communication should increase cognitive trust. Also, when information provided by Marketing is high quality, R&D Managers will be better able to achieve individual and joint goals (Gupta & Wilemon, 1988), and will be more likely to perceive their CFR to be effective. We therefore hypothesise:

\[ H_{4a,b}: \text{Greater quality of communication will lead to: (a) greater CBT, and (b) higher perceived relationship effectiveness.} \]

4.3 **Effects of the Structural Dimensions**

4.3.1. **Effects of Formalisation**

Formalisation establishes managers' role expectations on NPD projects, and expected information flows between managers (Moenaeart & Souder, 1990a). Formalisation should therefore affect the frequency of communication between functional managers, and consistent with this, Ruekert and Walker (1987) found that higher formalisation was associated with increased communication flows between Marketing and R&D, Manufacturing, and Accounting. Similarly, Moenaert et al's (1990b) study of information use during NPD projects found that formalisation increased formal and informal communication between Marketing and R&D personnel.

In related research, Moenaert et al., (1994) found that formalisation was positively associated with reciprocal communication between Marketing and R&D, i.e., bidirectional communication. Similarly, Song, Neeley and Zhao (1996) found that formalisation has a small positive effect on information exchange between Marketing and R&D in the planning phase of NPD. We therefore hypothesise:

\[ H_{5a,b}: \text{Greater project formalisation will lead to (a) greater communication frequency, and (b) greater bidirectional communication} \]
4.3.2. Effects of Centralisation

The effects of centralisation on communication have been examined in several literatures, and Hage et al.'s (1971) study of strategic decision-making found that decentralisation increased the frequency of unscheduled cross-functional interaction. Similarly, the NPD literature suggests that centralisation has a negative effect on information sharing and cross-functional communication flows (e.g., Gupta & Wilemon, 1988; Ruekert & Walker, 1987). On this basis we expect increased centralisation on NPD projects to reduce communication frequency. In addition, Moenaert et al., (1994) found that centralisation was negatively associated with communication flows between Marketing and R&D functions during NPD, i.e., lower bidirectionality. Similarly, Song et al. (1996) found higher centralisation on NPD projects had a small negative effect on level of information exchange between these functions in the NPD planning phase. We therefore hypothesise:

H6a,b: Greater project centralisation will lead to: (a) lower communication frequency, and (b) lower bidirectional communication.

5. Method

5.1 Data Collection and Sample Characteristics

Data was collected from R&D Managers in Australian manufacturing companies, using a pretested, mailed, self-administered questionnaire. The sampling frame came from a commercial mailing list and was screened to eliminate firms unlikely to be involved in NPD. In total, 334 Managers agreed to participate in the study, and after 2 mailouts this resulted in a 184 usable responses, a net response rate of 54%. The achieved sample comprised 184 firms, 95.1% were goods producers, and the remaining 4.1% were software producers. Consumer marketers accounted for 47.7%, business-to-business marketers 44.8%, and 7.5% sold into both markets.

5.2 Evaluating the Quality of the Data Collected

Tests of non-response bias found no significant differences between early and late respondents. On average, the R&D Managers had worked for 5.75 years in their position, suggesting that they were experienced and knowledgeable about the issues covered in this research.

5.3 Operational Measures and Measure Refinement

Two types of measures were used in our study, one formative multi-item measure—communication frequency, and seven reflective multi-item measures—formalisation, centralisation, bidirectional communication, quality of communication, cognition-based trust, affect-based trust, and perceived relationship effectiveness.

The reflective multi-item measures were examined using exploratory factor analysis and found to be unidimensional. CFA was then conducted using AMOS 4 (Arbuckle & Wothke, 1999) in 2 stages (cf. Bentler & Chou, 1987). Stage 1 included formalisation and centralisation, and the two reflective communication constructs (bidirectionality, and quality). Stage 2 included the two interpersonal trust dimensions (cognition- and affect-based trust), and our dependent variable perceived relationship effectiveness. Both Stage 1 & 2 achieved good model fit, e.g., Stage 1: $\chi^2 = 128.126$ (df = 71, $p = .000$), $\chi^2/df = 1.805$, GFI = .915, CFI = .964, and RMSEA = .066.

The t-statistics for each item were all statistically significant (Anderson & Gerbing, 1988), and the average variance extracted for each construct exceeded .50, therefore convergent validity was established. Discriminant validity was established using Fornell and
Larcker’s (1981) criterion. Reliability analysis reveals that the alpha coefficients for the scales are .79 or higher, suggesting a good degree of internal consistency amongst the items.

6. Results

6.1 Descriptive Results
Overall, these relationships seem reasonably effective, though there is a wide variation in CFR effectiveness in our sample. The mean score for perceived relationship effectiveness is 5.15 (s.d. = 1.32), (maximum score = 7), and it seems that on average, relationship effectiveness between the Marketing Managers and R&D Managers is fairly high. Similarly, both trust constructs are above the mid-point of the scale, with cognition-based trust ̄x = 5.19 (s.d. = 1.23), and affect-based trust ̄x = 4.83 (s.d. = 1.54), suggesting that on average, there is a reasonable amount of interpersonal trust between these managers.

6.2 Model Estimation and Testing Results
Prior to model estimation, the items retained after the CFAs were transformed into summated measures using equally weighted scales, and used in a path analytic approach (cf. Li & Calantone, 1998, p. 88). AMOS 4 was used to estimate the structural model, and measures of model fit suggest that the data fitted our conceptual model well, with χ² = 31.492 (df = 12, p = .002), χ²/df = 2.624, GFI = .961, CFI = .973. Although the RMSEA = .094, marginally exceeded the benchmark of <.08, the other fit statistics suggest that overall model fit is adequate.

The squared multiple correlation for perceived relationship effectiveness is .732, hence the constructs in our model explain 73.2% of the variance in our dependent variable. The results of the hypotheses testing reveal that only 3 of the 16 hypotheses were non-significant i.e., H2b, H2c, and H6a. Space limitations prevent the reporting of the results of all of the hypothesis testing, however below we summarise some of the major findings.

The variable with the greatest direct impact on relationship effectiveness is cognition-based trust (Std. path coefficient = .357, p ≤ .01), followed by affect-based trust (S.P.Coeff = .301, p ≤ .01), communication quality (S.P.Coeff = .161, p ≤ .05), and bidirectional communication (S.P.Coeff = .155, p ≤ .05). Our results therefore demonstrate the importance of trust and communication in driving CFR effectiveness between Marketing Managers and R&D Managers on NPD projects. Our results also demonstrate that communication has an important role in building trust. Quality of communication has the strongest effect → cognitive trust (S.P.Coeff = .534, p ≤ .01). Also, bidirectional communication → affective trust (S.P.Coeff = .312, p ≤ .01), and cognitive trust (S.P.Coeff = .216, p ≤ .05). However, communication frequency did not lead to the development of cognitive trust as hypothesised.

Our results also reveal that only formalisation had the anticipated effects on communication behaviours. Specifically, formalisation → frequency (S.P. Coeff = .302, p ≤ .01), formalisation → bidirectionality (S.P. Coeff = .148, p ≤ .05). Centralisation had no effect on communication frequency (S.P. Coeff = .043, N.S.), and the opposite effect than was hypothesised on bidirectionality (S.P. Coeff = .177, p ≤ .05).

7. Discussion

7.1 Theoretical Implications
As predicted, we find that interpersonal trust is an important determinant of effective CFR on NPD projects. In particular, cognition- and affect-based trust have a direct positive impact on perceived relationship effectiveness, with cognition-based trust having the stronger effect. Where a Marketing Manager demonstrates this competence, the R&D Manager will be more
likely to have cognition-based trust in them, and perceive their relationship to be more effective. Similarly, if there is affect-based trust between these two managers, the R&D manager will again be more likely to perceive their relationship to be effective. Our findings therefore support the view that where trust is present, this can help break down the barriers represented by personnel operating within “functional silos,” with different thought-worlds, language and jargon (Dougherty, 1992). Departments with conceptual and operational domains as dissimilar as Marketing and R&D have a high potential to develop ineffective CFRs, and interpersonal trust appears to be a key mechanism by which these two functions can work more effectively together.

Our findings also provide insights into the role of various communication behaviours in the Marketing/R&D CFR. Specifically, whilst the communication dimensions in our model have direct effects on relationship effectiveness, their most pervasive effects operate indirectly via interpersonal trust. In particular, both bidirectional communication and quality communication have strong trust-building effects. One finding which is contrary to the interactionist view, is that frequent communication can improve CFRs. Our results do not support this, as communication frequency was not positively associated with either cognitive trust, or relationship effectiveness.

Turning to the impact of the structural/bureaucratic variables, formalisation operates in the hypothesized manner, by helping increase both frequency and bidirectionality of communication. However, centralisation had not effect on communication frequency, and an unanticipated positive effect on bidirectionality. The reasons for this are unclear, although it may be that the nature NPD being complex, non-programmable problem-solving explains this result. In may be that when centralisation increases on NPD, that participating managers find it more important in achieving individual and group goals, to establish bidirectional communication flows. By doing this they may seek to avoid communication blockages caused by managers further up in the firm’s hierarchy.

### 6.2 Managerial Implications

Our findings have implications for managers wishing to improve the performance of managers on NPD projects. For example, one major implication flowing directly from our research is the salience of interpersonal trust in building and maintaining effective CFRs. In particular, Marketing Managers should be aware that in order for R&D Managers to begin building trust in them, they must first demonstrate their competence and professionalism. Our results suggest that once this competence is demonstrated, cognitive trust may emerge, and where this develops, the qualitatively more “special” form of trust, affective trust may develop (Johnson-George & Swap, 1982). The positive effects of these two forms of trust on relationship effectiveness, both singly, and in combination, are substantial.

In addition, our findings reveal that effective communication (quality and bi-directional) are important in building trust, and in directly improving relationship effectiveness. Management should therefore consider strategies to improve these forms of communication between Marketing Managers and R&D Managers on NPD projects. Lastly, formalisation seems an effective tool for managers to stimulate frequent, and bidirectional communication on NPD projects.

### 7.2 Limitations and Directions for Future Research

A major limitation of our research is that it is restricted to R&D Managers perceptions of the CFR, and future research will need to examine the relationship from the perspective of Marketing Managers. Ideally, however, researchers need to examine R&D Managers and Marketing Managers simultaneously i.e., use dyadic data. In addition, we draw our inferences from cross-sectional data, and future research could use longitudinal data to better establish internal validity. Lastly, whilst we draw on two main theoretical frameworks to specify our
model, other frameworks such as structural contingency theory, and resource-dependence theory might provide further insights into this CFR.

References


